Integration of GIS with a new Property Appraisal System in Denmark

2017 GIS & CAMA CONFERENCE

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Copenhagen

SKAT

BruceHarris & Associates, Inc.

Geo-centric Consulting, Inc.

King's former Castle

City Hall

Hans Christian Anderson's Home

Don't ask!

Harald Bluetooth, son of Gorm the Old and Queen Thyra

The Bluetooth communications protocol in these devices is named after a Danish King, because he unified Denmark and Norway, much like the technology whose goal was to unify computers and cellular phones.
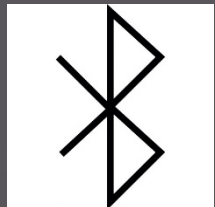
Harald Bluetooth, son of Gorm the Old and Queen Thyra

Harald Bluetooth, son of Gorm the Old and Queen Thyra

The Bluetooth logo consists of the Nordic Runes for his initials, Runic letters H and B.

The Bluetooth symbol is a bind-rune, which means that it is formed from two runes that are merged together. Runes are the ancient Norse letters that, according to mythology, Odin (husband of the goddess Frigg) discovered and gave to gods and humans.
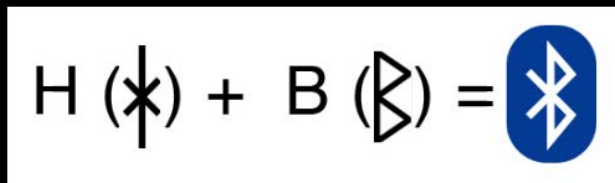
Harald Bluetooth, son of Gorm the Old and Queen Thyra

If you take the rune for "H"

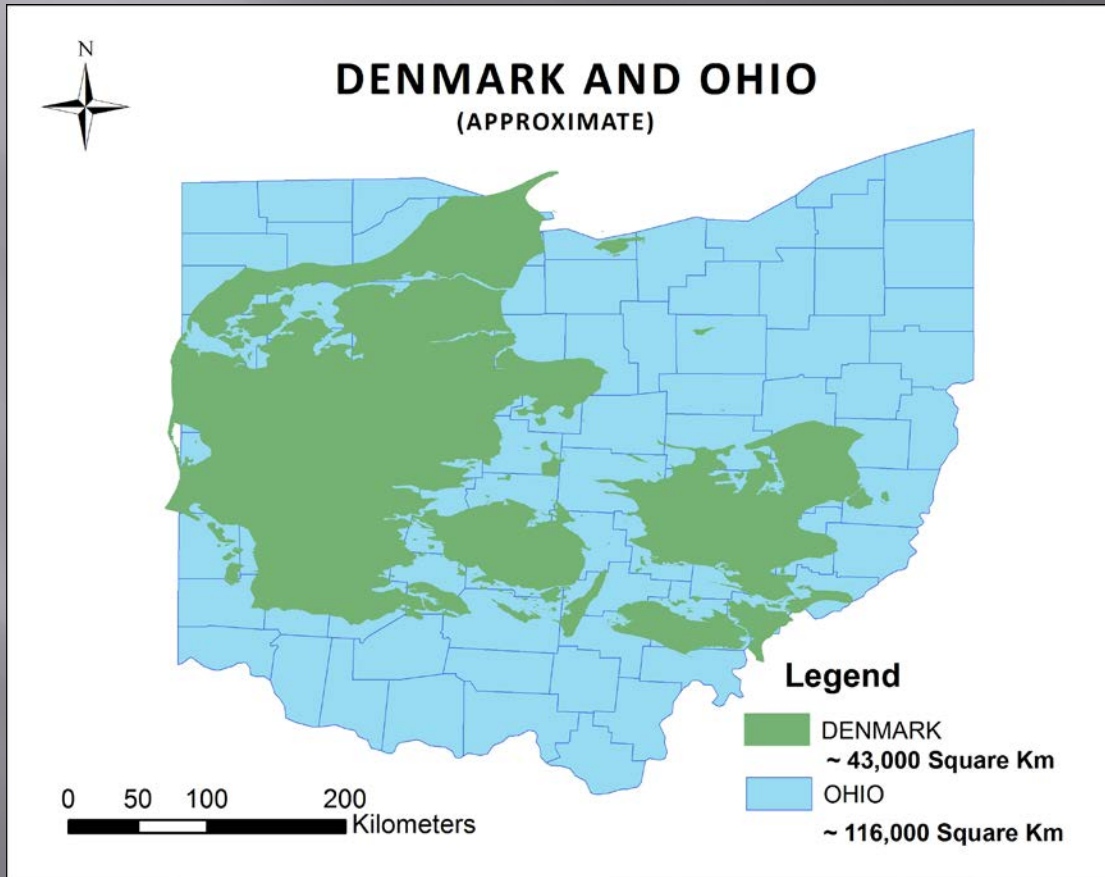and combine it with the rune for "B"

you get the Bluetooth logo

H (⚹) + B (ᛒ) = ᛒ

Styrbjörn the Strong

Harald Bluetooth's children

Sweyn Forkbeard, brother in-law of Styrbjörn the Strong, father of Cnut the Great. Sweyn led the uprising that resulted in his father's death!

Denmark vs. Ohio

Extensive Planning

Workshop planning/Background from ICE

Regarding organization, processes, roles and deliverables these are briefly illustrated in the organizational chart and roles diagram at the end of this email. I have added a brief description of roles per actor/area of responsibility to help you understand how the system is being developed. Bo and myself could try to elaborate verbally on the areas where you feel you need further information.

As for documentation, all hard copy and web material is only available in Danish, but perhaps where necessary, you could try Google Translate? Otherwise we will try to help you where you feel you need more details.

However, there are a couple of documents/links that you might find useful and which are freely available online (if you dare use Google Translate though). The first is the official report, published in 2014, which set off this huge undertaking. It is titled "Forbedring af ejendomsvurderingen" which kind of translates into something like "Towards an Improvement of the Property Valuation System". You will find it here: http://www.skm.dk/media/1106957/Forbedring-af-ejendomsvurderingen_web.pdf

In addition to this, you might also find useful some of the links to background material/FAQ available through this link: http://www.skm.dk/skattetal/analyser-og-rapporter/rapporter/2014/september/forbedring-af-ejendomsvurderingen-resultater-og-anbefalinger-fra-regeringens-eksterne-ekspertudvalg/ekspertudvalg-om-ejendomsvurdering

SKAT Background

Organization

The Centre for Property Valuations (ICE) was established in the Autumn of 2014 aimed at developing proposals for new property valuation laws, developing assessment models for residential, commercial and forestry/agriculture properties, collecting data, developing a new IT system, designing processes, and establishing a dedicated property assessment organization. The center is an independent programme organization rooted in the taxation department.

SKAT Background

Organization

Law

Data

Model

System

Processes – We were hired here

You can read more on the foundations for this programme via these links

(in Danish w/Google translate):

http://www.skm.dk/aktuelt/nyheder/2016/marts/bedre-data-skal-give-mere-retvisende-ejendomsvurderinger

http://www.skm.dk/aktuelt/presse/pressemeddelelser/2014/september/danskerne-skal-have-gennemsigtige-og-gennemskuelige-ejendomsvurderinger

Google translate works well enough!

SKAT Background

Skatteministeriet

9th October 2013

Confidence in property valuations - Responding to a model of public property valuations

Public property valuations have not been good enough. Therefore, the Danes have a new and improved assessment system, as a committee of outside experts to come up with proposals before next June. Committee recommendations will form the basis for the new 2015 assessments, which should have a better accuracy.

For homeowners who pay property taxes for SKAT's current assessment, the Government proposes that taxes for previous years are recalculated if the assessment in 2015 turns out to be lower than that in 2011. The calculation results in a smaller tax amount, the owner will automatically get the difference paid.

SKAT Background

Skatteministeriet

11th september 2014

Improvement of property valuation - Expert Committee will present findings and recommendations

New mechanical models to improve future property valuations, making them more transparent and provide greater accuracy. The models must be based on data on trade prices for free trades and data on the individual property. The Committee has examined nearly 100 different types of data and have selected the data that matters most. These data should henceforth be included in the assessment of the individual home. It should simultaneously be easier for the owners to correct errors in data and calculations. These are some of the key recommendations that the government's expert committee on property valuation presents today the publication of their report.

Skatteministeriet

30th March 2016

Better data to provide more accurate property valuations

Tax Ministry sent a document to implement a number of large data projects to the Finance Committee. An improved data base is crucial if the goal of more accurate property valuations to be redeemed.

The quality of existing data on the country's millions of properties to be improved and updated, and there must be provided new data. It is necessary, to compile more accurate property valuations with a higher accuracy.

The government set to embark on a number of projects together with other authorities in order to create the best conditions for a robust data base. They include information on things called acting, spatial data, BBR information and plan data.

Taxation Karsten Lauritzen sees work to build an even stronger data basis as an important step towards the autumn negotiations on a new property assessment system.

"Regardless of how a new system will look like, there are a number of data which are essential to obtain - for instance prices and BBR information. It costs some money, but it is a prerequisite for a more accurate system," says Karsten Lauritzen.

It is now up to the Parliamentary Finance Committee to approve the document which gives Treasury the power to implement data projects.

SKAT Background

New hardware assessment model for home ownership

The main recommendations for new evaluation model for owner-occupied housing are:

- The assessment of the country's approximately 1.7 million. home ownership should be based on actual trading prices of comparable properties nearby
- All ratings should be based on objective data and criteria
- GPS data involved to cater for example, distance to the road, overlooking the water and rail in the backyard mm
- The assessments should as far as possible be transparent and accessible calculation for individual owners and on SKAT's website
- The owner should be involved early in the assessment process and given the opportunity to digitally correct incorrect data
- The taxable value of land belonging detached and terraced houses set as a political or statutory share of the total property value

Day 1
Introduction to the Ohio experience
Agenda

Introduction

Benefits

Challenges

Solutions

Adopting existing standard GIS Platforms (COTS/CAMA) versus in-house development

337 SLIDES TOTAL

Day 1
Users: GIS Functionality & Best Practices Agenda

Functionalities of GIS for property appraisal

Working methodologies / processes

Best Practices

Statistics of usage

Enqueries / Complaints

Caseload details

Day 2
Data: Collation & Maintenance
Sources & Structures
Agenda

Data Sources

In-house Maintained

Contracted Services

Data Structure / Architectures / Platforms

Data Maintenance

Day 2
Users: System Architecture, Data Components, System Review
Agenda

Component Review and System Necessities
  Appraisal Data Components
  GIS Infrastructure / Architecture
Production System Milestones
  Deployment Timeline
Best Practices / Objectives
  Production Workflows
Application Review

Day 3
Public: Geospatial Appraisal and the Public Agenda

Public Participation – working methodologies and processes

Scenario 1 – Taxpayer Complaint

Scenario 2 – Data Verification

Best Practices

Tax Notices and process

Types

E-taxes

Day 3
Conclusion to the Ohio Experience

- *Staff Considerations*

- *Lessons Learnt*

- *Return on Investment*

- *Future Developments*

Technical challenges

Obstacles include:

- Fast paced development of the geospatial marketplace

- Frequent changes in COTS software solutions

- Lack of reliable data and difficulties in maintaining data

- Advances in data architectures, platforms, clouds, mobile

Organizational Challenges

Silos of data due to:

Legal requirements

Physical separation of facilities

Legacy protocol & business practices

Disparate systems, platforms, architectures, communication protocols

Entrenched organization-centred business practices

Denmark mirrors U.S. here

GIS Solution Types

Commercial Off-the-Shelf (COTS)

COTS Vendor Customization

Free and Open Source (FOSS)

In House Solutions

Custom Solutions

GIS Solution Types

Commercial Off-the-Shelf (COTS)

The Paperless Reappraisal System from Bruce Harris & Associates, Inc.

This end to end solution was used as a Best Practice example to illustrate the use of GIS throughout the life-cycle of property appraisal

Why not more FOSS in the U.S.?

Many feel that compared to popular COTS offerings, features and functionality are lacking in FOSS

Reliable, fast technical support is lacking

An avoidance of perceived risk

Adopting existing standard GIS Platforms (COTS) versus in-house development

Adopting existing, commercially available CAMA system (Computer-aided Mass Appraisal) versus in-house development

Best Practices / Objectives

FOSS Pros

- *Fewer bugs*
- *Better security, performance, reliability*
- *Faster release cycles*
- *More modularity & flexibility*
- *Less total cost of ownership*
- *Freedom from control by a single source*
- *Freedom from licensing management (with its accompanying litigation)*

Best Practices / Objectives

FOSS Cons

Can lose staff and if processes are not heavily documented there can be significant knowledge gaps

Constantly needing to re-educate and reinvest

Typically lagging behind latest technology and trends

Current Status

New GIS Architect has been hired and left and another hired since our return

No appeal process since 2011

No Valuation updates since 2001

Custom FOSS solutions are their current direction

Recent Status

From Charlotte from **Agency for Data Supply and Efficiency,**

"… having weekly meeting with the analyst team at SKAT. We're generating the Geographical Variables:

- *Various distances to wood, coast, windmill, power lines etc.*
- *Unevenly shaped' parcels, terrain analysis for steep slopes on parcels (NOT a big issue in flat Denmark)*
- *Viewshed analysis, 'can you see the sea/lake from your house'.*

Furthermore we have had a bigger meeting last week where 10 people from my organization paid a 2 hour visit to SKAT to introduce all the data and services that we offer (geospatial data, orthophotos, DTM).
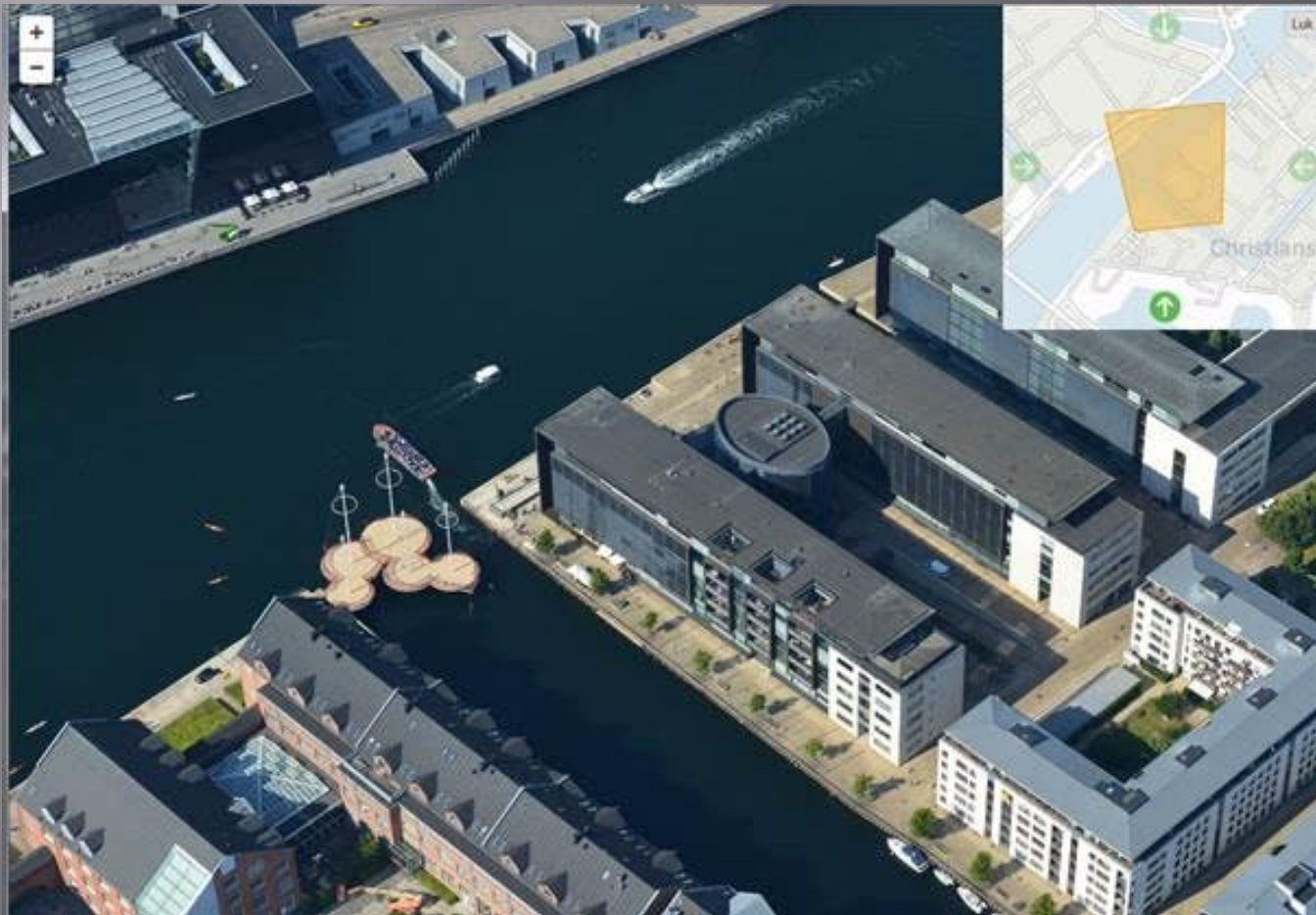
Robust existing Geospatial Infrstructure

http://kbhkort.kk.dk/spatialmap

Click the tab 'Vis skråfotos'
(Click in the map to see an oblique imagery for the area)

Robust existing Geospatial Infrstructure

http://kbhkort.kk.dk/spatialmap
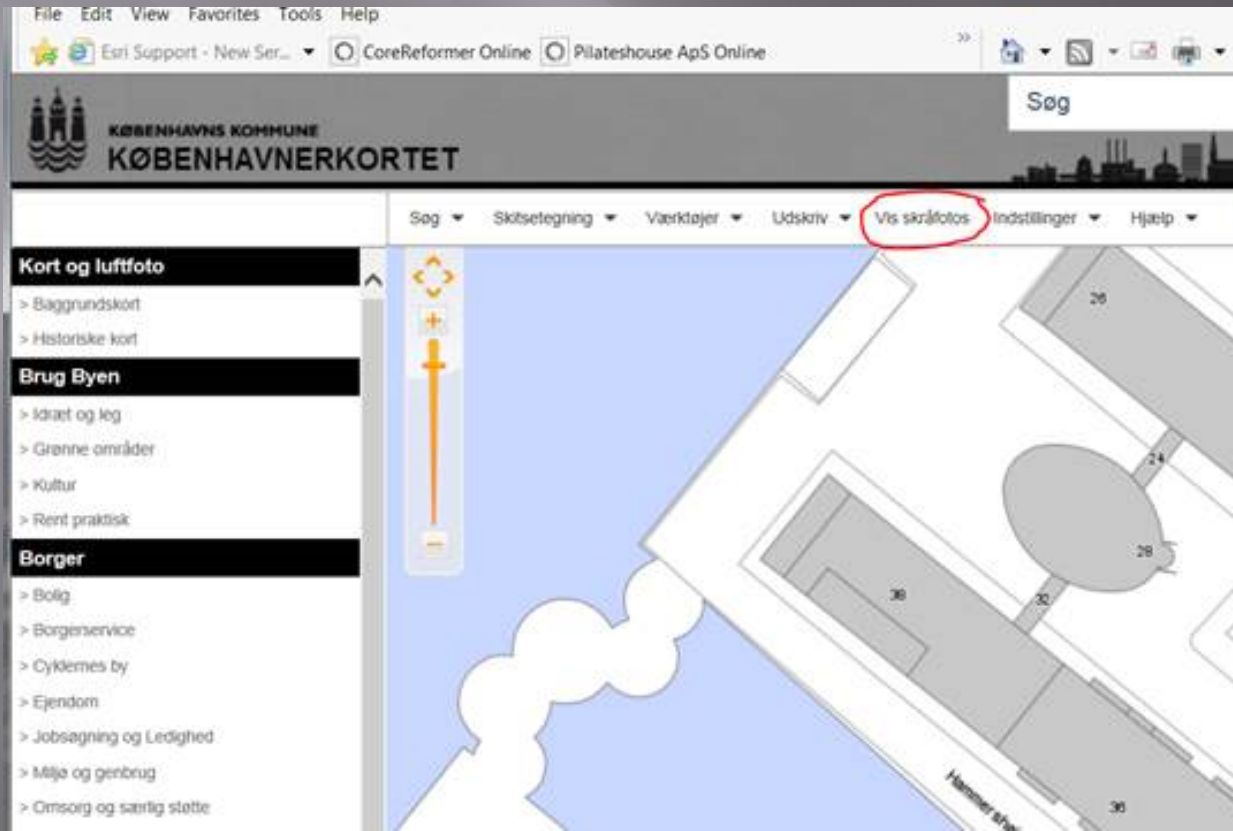
Introducing Travis Gregorich

Production System Milestones

Deployment Strategy

Mi.1 Project Initiation

Mi.2 Project Data Model

Mi.3 Geodatabase Creation / Design

Mi.4 Content Publishing Procedures

Mi.5 Deploy and Configure Cloud Content

Mi.6 Integrate Complementary Image Services

Mi.7 Application Configuration

Mi.8 User / Administration Training

Mi.9 External Data Maintenance / Automation

Mi.10 Project Review

Post-trip Considerations
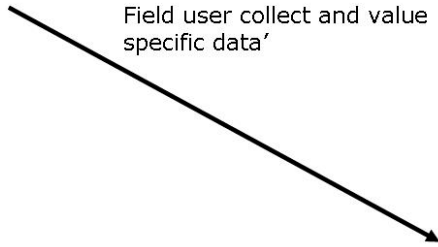
Appraisal Authority

Valuation has "grouped parcels" referencing one PIN

Field Appraisers ~500

Own and create table rates

Field user collect and value specific data'

Short project timeframe - custom solution increases implementation time
Each agency owns their data and are the ONLY editors.
Ministry of Taxation is mainly comprised on "data modelers" with minimal GIS integration
Ministry of Taxation seems to be the end user / viewer of the data with minimal editing capabilities
REST services are available within certain departments with complete ESRI integration
Data must be "destroyable" due to war time legislative rules
AGOL could may not be available via due to no Denmark Server locations.
New GIS Architect has been hired since our return.
No appeal process since 2011
No Valuation updates since 2001
They have a DESIRE to be more transparent via GIS viewer and data integration

Ministry Of Taxation (New System)

BBR owns and maintains the building data (sq. meter)

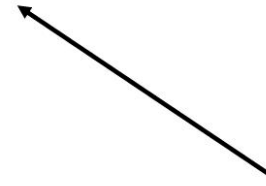Building outlines do exist, but likely no data correlation

View only for valuation dept.

Could create generic polys to compare BBR sq meter vs. outline?

Assess BBR data, processes for use in SKAT system

Permit Data housed in BBR

BBR

Limited knowledge of BBR data within SKAT

GIS

Parcels number are complete for land records but unique naming convention in progress.

ESRI integrated with map Services in place.

Problematic, yet improving, communication

Appraisal Authority

Valuation has "grouped parcels" referencing one PIN

Hiring of new Field Appraisers ~500

Own and create table rates

Field user collect and value specific data

Appraisal
Authority

BBR

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Post-trip Considerations

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ESRI integrated with map
Services in place.

Problematic, yet improving, communication

1.7 million parcels

GIS

Thoughts and Observations

Short project timeframe - custom solution increases implementation time

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Thoughts and Observations

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Takeaways and Observations of a mass appraiser based on limited exposure to the process

Scott Yamamoto, certified appraiser from Lake County, Ohio provided crucial information, advice and credibility regarding GIS-centric property appraisal.

Scott could not attend today.

Basic Issue – Keeping it Simple

SKAT has two groups of people working towards the same goal but not necessarily with each other

New Group

- *Sixty person team with diversity of backgrounds*
- *General requirements set by Parliament.*

Old Group

- *Limited GIS, analysts & modelers.*
- *Severely outdated real property values and limited property data*
- *Using a DB that is 30 years old plus.*

Problems

Need to produce a global software solution that incorporates all their needs in one solution.

Building software from scratch is time-consuming, extensive gap analysis is needed, large amounts of resources. Coordination has been an issue getting technical issues and fundamental issues to work together.

Time: Values are not getting better –the longer time goes without a   mass reappraisal the worse the values and appeals are getting. Case Workers (appraisers) are over-whelmed.

Property data is housed by 2 different data warehouses. Values/salient data are in one place and sketches/square footages are elsewhere.

Progress During the Trip

Workshops brought the new group and the old group in together so both groups were in the workshops. KEY POINT

Meaningful dialogues began in the sessions between the 2 groups during sessions as well as breaks.

The new group started learning that some of what they were trying to build was already created by the old group (digitized maps).

The old group were eager to share ideas for the new software based on what they needed to do their job.

Progress During the Trip

Inspired communication and collaboration

Staff share trials and tribulations

We emphasized uses of GIS for mass appraisal data and statistical analysis (neighborhood coding, mapping sale ratio outliers, illustrating value changes by color-coding maps, support of value data, etc.)

Suggestions for Solutions

Suggested Off the Shelf Solution with Customization

- *Would be able to move forward lots faster*
- *Software provider provides support*
- *Software provider updates for law changes/changes to platform/technical issues*
- *They can then spend their time and energy on collecting the data and centralizing it. Bringing sketch/square footage and relevant data together – integrating with GIS, aerial photography etc.*

QUESTIONS?